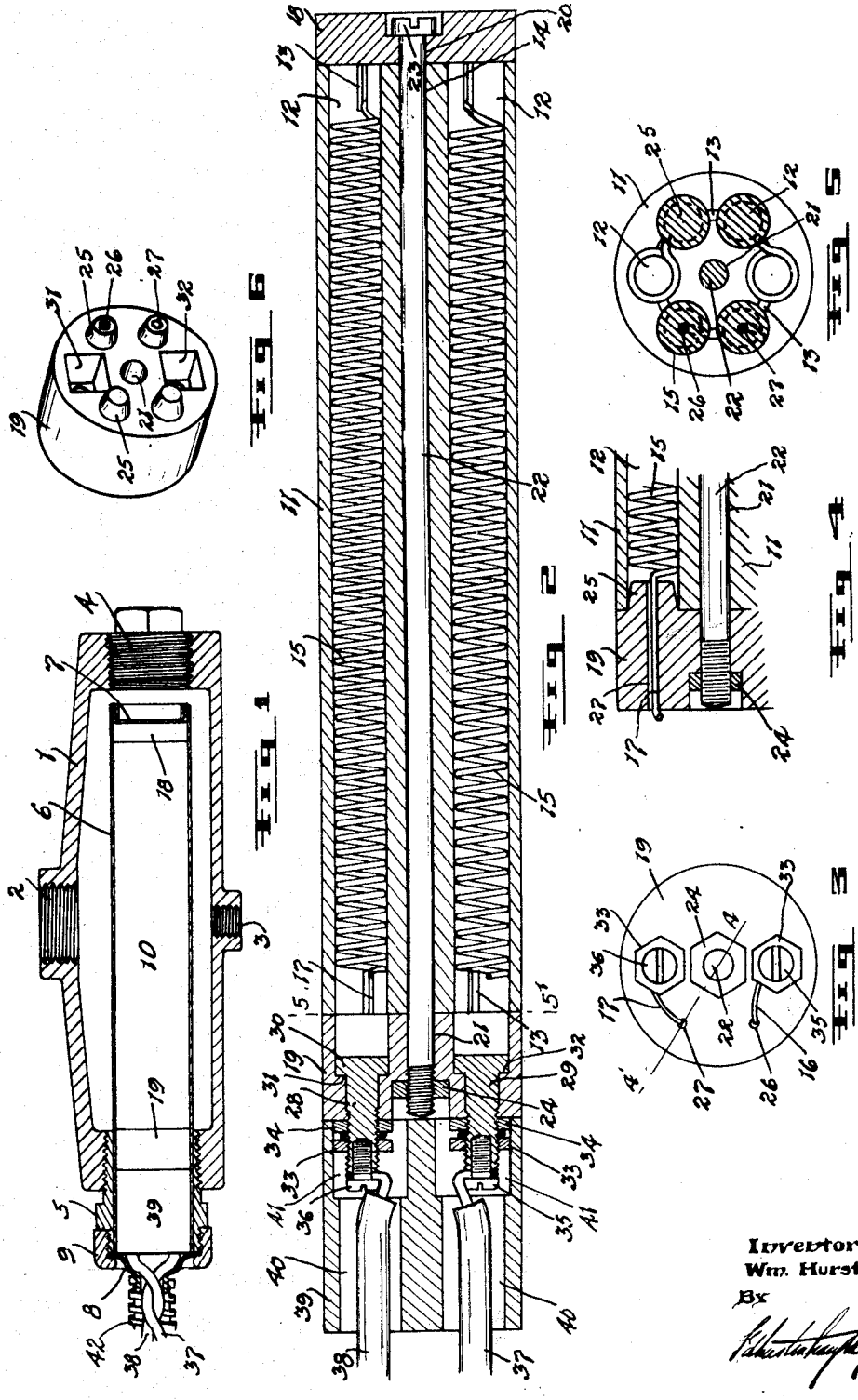
Nov. 20, 1928. 1,692,741

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ELECTRIC HEATER

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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATER.

Application filed December 10, 1925. Serial No. 74,581.

The invention relates to improvements in electric water heaters particularly as used in connection with automobile water circulating systems and an object of the invention is to provide an improved heating element for use in a water heater, the element being arranged so that it can be removed from the heater as a unit and without requiring to otherwise disturb the heater.

A further object is to provide a heating element formed from comparatively few parts which can be readily assembled and connected together and which is designed such that all current carrying parts are effectively insulated. A further object is to design the parts so that they can be readily disconnected for repair or inspection purposes and such that the main body of the element is formed from a single insulator having a plurality of concentrically arranged and spaced lengthwise extending openings therein receiving the heating coils and slotted at the ends to form passages interconnecting the ends of the holes.

With the above more important objects in view, the invention consists essentially in the arrangement and construction of parts hereinafter more particularly described, reference being had to the accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view through an electrical water heater having my heating element therein, the heating element being shown in side elevation.

Fig. 2 is an enlarged detailed horizontal sectional view longitudinally through the heating element.

Fig. 3 is an end view of the element with the guard cap removed.

Fig. 4 is a cross sectional view at 4—4′ Figure 3.

Fig. 5 is a vertical cross sectional view at 5—5′ Figure 2.

Fig. 6 is a perspective view of one of the closure caps.

In the drawing like characters of reference indicate corresponding parts in the several figures.

The body or boiler 1 with which the present heating element is used is provided at one side with a screw threaded outlet opening 2 and at the other side with a screw threaded drain opening 3 and has one end thereof provided with a removable screw plug 4 and the other end with a removable screw threaded sleeve 5. The sleeve carries a tube 6 which is permanently fastened thereto and which extends lengthwise within the open centre of the body 1. The inner end of the tube is closed by a permanent cap 7 and the outer end thereof is closed by a cap 8 held in place by a flanged ring or collar 9 screw threaded onto the outer end of the sleeve. A more detailed description of the above parts is given in a co-pending application filed concurrently herewith.

The heating element indicated generally by the reference numeral 10 and which forms the subject matter of the present application is adapted to slide endwise within the tubular casing 6 and to be retained therein by the cap 8 which latter is held in place by the flanged ring or collar 9.

The main body 11 of the heating element is cylindrical in form and has a length slightly less than the length of the tube 6 and an external diameter slightly less than the internal diameter of the tube. The said body is formed from an insulating material such as lava and is drilled lengthwise to provide a plurality of concentrically arranged and equi-spaced holes or openings 12. The ends of the openings are interconnected by cross slotting, as indicated at 13, the webs or intervening walls retained between the said openings 12. The body 11 is also lengthwise drilled to provide a central opening 14. The body piece 11 is herein shown as provided with six concentrically arranged openings 12.

In the openings 12 I mount the heating coils 15 which are formed from a continuous length of coiled wire passed successively up and down the several openings. The ends of the coils in adjacent holes 12 are connected by passing the wire through the connecting slot 13 and the ends or terminals 16 and 17 of the wire both extend at one end of the body piece from adjacent openings 12.

The ends of the body piece are closed by closure caps 18 and 19 of insulating material and both caps are provided with central openings or holes 20 and 21 which receive a comparatively long tie bolt 22 which passes also through the central hole 14. The bolt has one end provided with a screw head 23 countersunk in the cap 18 and the other end screw threaded to receive a nut 24 countersunk in the cap 19. The bolt 22 is preferably made from nichrome as I have found such material will best withstand the intense temperature developed in the element. It will be apparent that when the caps are put in position

and the bolt is tightened up, the coils are tightly enclosed within the body 11 and effectively insulated.

The cap 19 is provided on the side next the body 11 with four short studs or legs 25 which are adapted to enter a similar number of the holes 12, these legs preventing any rotary movement of the said cap. The cap is also drilled to provide two holes 26 and 27 which extend also through two of the adjacent legs and the terminal wires of the wire pass out through these holes in the manner best shown in Figures 3 and 4.

Binding posts 28 and 29 are provided, these having their inner ends formed with enlarged heads 30 which are seated in pockets 31 and 32 formed in the inner face of the closure cap 19 and their outer ends fitted each with a pair of nuts 33 and 34, the inner nuts 34 when tightened up securing the binding posts in place and the outer nuts 33 serving to fasten the terminals 16 and 17 of the wire. The outer ends of the posts 28 and 29 are drilled and screw threaded to receive jam screws 35 and 36 and these jam screws are utilized to fasten the ends of the feed wires 37 and 38 to the posts. An insulating guard cap 39 is also provided and this is supplied with holes 40 through which the wires 37 and 38 pass and the inner ends of the holes are enlarged to provide pockets 41 which receive the outer ends of the binding posts and parts carried thereby. The outgoing ends of the feed wires are enclosed within and protected by a flexible casing 42.

The heating element after it has been inserted in the casing 6 is held in place by the cap 8 and the flanged ring 9.

From the above description it will be seen that the heating wire can be easily and quickly threaded through the openings 12 and the element subsequently quickly connected together and that when the parts are finally assembled, the heating wire and all electrical connections are effectively insulated.

Further it will be observed that one can readily remove the heating element from the tube 6 without disturbing the tube, such being done by unscrewing the cap 9 and withdrawing the element as a unit. When the element is being withdrawn, there is no possibility of disturbing the heating wire or its connections as these all remain fixed until one releases the bolt 22. As the guard cap 39 simply encloses and insulates the outer ends of the binding posts, one does not in any way disturb the latter parts when he endshifts the guard cap to permit him to get at the jam screws or the terminal nuts.

What I claim as my invention is:—

1. In an electrical water heater, a tube having one end closed and the other end open, a sleeve surrounding and permanently secured to the latter end of the tube and having the inner and outer ends exteriorally screw threaded and provided between the threads with a nut-like head, an electrical element endwise slidable within the tube, a cap covering the open end of the tube and retaining the element and a flanged ring engaging the cap and screw threading onto the outer end of the sleeve.

2. In an electrical water heater, a heating element comprising a cylindrical body of insulating material having a centrally disposed lengthwise extending opening therein and spaced lengthwise extending openings grouped around the central opening and passing through the body, the ends of the latter openings being connected by cross slots, insulating caps closing the ends of the body, a bolt passing through the caps and through the central opening aforesaid and fastening the caps to the body and an electrical heating coil passing successively through the remaining openings and across the slots and having the end terminals thereof extending outwardly through suitable openings provided in one of the caps.

3. In an electrical water heater, a heating element comprising an elongated cylindrical insulating body provided with a lengthwise extending centrally located bolt opening and having concentrically arranged spaced coil receiving openings passing lengthwise therethrough and slots connecting the ends of the coil receiving openings, insulating closure caps applied on the ends of the body, a bolt fastening the caps to the body and passing through the bolt opening aforesaid, binding posts carried by one of the caps and a heating coil passing successively through the coil receiving openings and across the slots and having the end terminals passing through the adjacent end cap and connected to the binding posts.

4. In an electrical water heater, a heating element comprising an elongated cylindrical insulating body provided with a lengthwise extending centrally located bolt opening and having concentrically arranged spaced coil receiving openings passing lengthwise therethrough and slots connecting the ends of the coil receiving openings, insulating closure caps applied on the ends of the body, a bolt fastening the caps to the body and passing through the bolt opening aforesaid, binding posts carried by one of the caps, a heating coil passing successively through the coil receiving openings and across the slots and having the end terminals passing through the adjacent end cap and connected to the binding posts and a cylindrical guard cap provided with pockets to receive and enclose the outer ends of the binding posts and with outlet holes for feed wires leading to the posts.

5. In an electrical heater, a cylindrical body of insulating material having a lengthwise extending centrally disposed bolt open-

ing therein and concentrically arranged spaced coil receiving openings passing lengthwise therethrough, the ends of the latter openings being connected by cross slots provided in the webs therebetween, insulating caps butting against and closing the ends of the body, a fastening bolt passing through the caps and the bolt opening and holding said parts together, the ends of the bolt being countersunk in the caps, binding posts passing through one of the caps and having the outer ends thereof fitted each with a pair of nuts, a heating coil passing successively through the coil receiving openings and across the slots and having the end terminals thereof passing through suitable holes provided in the latter cap and fastened to the terminals by the pairs of nuts aforesaid, feed wires connected to the outer ends of the terminals and an insulating guard cap having openings admitting the feed wires and provided with pockets receiving and enclosing the binding posts and nuts thereon.

Signed at Winnipeg, this 31 day of October, 1925.

WILLIAM HURST.